

## REMARKS

This preliminary amendment accompanies a request for continued examination (RCE). Claims 37-73 and 86-111 are currently pending for further examination. Claims 45-47, 49-50, 52, 86, 90, 92-93 and 98 are currently amended.

### **35 U.S.C. § 112 Rejections**

#### **I. § 112, ¶ 1 Rejection**

The Office Action asserts that the limitation “substantially the same composition and thickness” fails to satisfy § 112, ¶ 1 “because the word ‘substantially’ is never used in the originally filed disclosure to describe any part of the invention.” (Final Office Action mailed September 20, 2006, p. 4). Applicant respectfully submits that the Examiner has misinterpreted the requirements of § 112, ¶ 1. It is well-established that lack of literal support in the specification for claim language is not enough to support a rejection under § 112 ¶ 1. *See, e.g., Eiselstein v. Frank*, 52 F.3d 1035, 1039 (Fed. Cir. 1995); *Kao Corp. v. Unilever U.S., Inc.*, 441 F.3d 963, 968 (Fed. Cir. 2006). As the MPEP states, “the subject matter of the claim need not be described literally (i.e., using the same terms or *in haec verba*) in order for the disclosure to satisfy the description requirement.” MPEP § 2163.02.

Instead, the appropriate inquiry under § 112, ¶ 1 is whether the specification “describe[s] an invention in sufficient detail that one skilled in the art can clearly conclude that the inventor invented what is claimed.” *Kao Corp.*, 441 F.3d at 967-968. “If a person of ordinary skill in the art would have understood the inventor to be in possession of the claimed at the time of filing, even if every nuance of the claims is not explicitly described in the specification, the adequate written description requirement is met.” *In re Alton*, 76 F.3d 1168, 1175 (Fed. Cir. 1996).

Moreover, where, as here, an applicant files a declaration explaining why those skilled in the art would find support in the specification for the claimed subject matter, the examiner cannot dismiss the declaration without “articulating adequate reasons to rebut” the declaration

*Id.* at 1176; *see also* MPEP § 716.01(B) (“[T]he examiner must specifically explain why [the declaration] is insufficient. General statements . . . without an explanation supporting [their] findings are insufficient.”).

As Applicant previously explained, although the deposited semiconductor layers can generally be characterized as having “the same” composition and thickness, a person of ordinary skill in the art would understand that the deposition process of the type described in this Application inherently leaves small variations in the thickness and composition of the deposited layers, resulting in layers that are “substantially the same” in thickness and composition. Thus, out of an abundance of caution and in the interest of technical accuracy, Applicant amended the claims to recite the phrase “substantially the same” and submitted a declaration under 37 C.F.R. §1.132 demonstrating why the phrase more accurately covers the compound semiconductor layer and is supported by the specification as would be understood by those skilled in the art. (*See* Applicant’s § 1.132 Declaration, p. 3) In view of the declaration, it was incumbent upon the Examiner to articulate adequate reasons for dismissing the evidence set forth in the declaration. *Kao Corp.*, 441 at 967-968 (Fed. Cir. 2006); MPEP §716.01(B). The Office action, however, did not articulate any reasons for dismissing the declaration except that the word “substantially” is not literally used in the specification to describe the claimed invention. This reason alone is not sufficient to support a rejection under § 112 ¶ 2. *See Eiselstein*, 52 F.3d at 1039; *Kao Corp.*, 441 F.3d at 968. Absent adequate reasons for dismissing Applicant’s declaration, the Examiner’s rejections under § 112, ¶ 1 are in error. *In re Alton*, 76 F.3d at 1176.

The Office Action also asserts that the limitation including a bottom layer of a bypass diode having the same polarity as a top layer of a top cell, as recited in claim 90, fails to satisfy § 112, ¶ 1 because “while n-type is and [*sic*] example of a polarity, it is not sufficient support for all possible types.” Applicants respectfully disagree and direct the Examiner’s attention to paragraph 58 of the published application which discloses examples of bypass diodes that may be formed with “p-on-n polarity” or “n-on-p polarity” in order to “preserve the integrity of the solar cell by preventing the solar cell from entering the reverse bias mode.” Furthermore, paragraphs 59 and 63 of the published application disclose the bypass diode is “formed over [a] multijunction cell structure” and that “while solar cells 604-608 [of the multijunction cell

structure] are in forward biased, bypass diode 620 is reverse biased because bypass diode 620 has an opposite polarity from solar cells.” Therefore, the specification clearly provides support for a bottom layer of a bypass diode having either p or n-type polarity. Furthermore, one of ordinary skill in the art would understand from the example set forth in the specification that a top layer of a top cell would have the same polarity as a bottom layer in a bypass diode since the bypass diode has an opposite polarity from the solar cell. Applicants further note that it is not necessary to disclose the explicit language of the claim limitations within the specification. Instead, newly added claim limitations may be supported through “implicit or inherent disclosure.” (see MPEP §2163 I(B)). Therefore, applicants submit the Office Action has failed to establish a *prima facie* case that a person skilled in the art would not have recognized the claimed subject matter in view of the disclosure.

The Office Action also rejected claims 46, 49, 90 and 92 under § 112, ¶ 1. To obviate these issues, Applicant has amended the pertinent claims and respectfully requests withdrawal of the rejections.

Based on the foregoing remarks and amendments, Applicant respectfully requests withdrawal of the rejections under § 112, ¶ 1.

## **II. § 112, ¶ 2 Rejection**

The Office Action asserts that the phrase “substantially the same thickness and composition” is indefinite under § 112, ¶ 2 because “it is not clear what is to be encompassed by [this] term[.]” (Final Office Action, p. 6) The Office Action further asserts that “the word ‘substantially’ introduces a ‘fudge factor’ that opens up whatever it is modifying to interpretation.” (*Id.*, p. 5) The Office Action also rejects the arguments raised in Applicant’s § 1.132 declaration “because it is not clear how close to having the same thickness the corresponding layers must have in order to be considered to have ‘substantially the same thickness.’” (*Id.*, p. 8)

Applicant respectfully disagrees with the Examiner’s conclusions. As indicated in Applicant’s response and declaration, the term “substantially the same thickness” corresponds to normal variations of up to two to three percent in composition and in thickness of a compound semiconductor layer over the surface of the wafer. (See Applicant’s § 1.132 Declaration, p. 2)

Contrary to the remarks of the Examiner, the specified normal range of up to two to three percent variations makes clear “how close to having the same thickness the corresponding layer must be” and falls well within manufacturing specifications for actual commercial products. (*See id.*)

To the extent the Examiner's rejection is based on a perception that the term “substantially” bears some imprecision, Applicant respectfully submits that § 112, ¶ 2 does not impose such a high threshold for claim definiteness. “That some claim language may not be precise . . . does not automatically render a claim invalid.” *Seattle Box Co. v. Industrial Crating & Packing*, 731 F.2d 818, 826 (Fed.Cir.1984). The MPEP instructs examiners in a similar vein:

When the examiner is satisfied that patentable subject matter is disclosed, and it is apparent to the examiner that the claims are directed to such patentable subject matter, he or she should allow claims which define the patentable subject matter with a reasonable degree of particularity and distinctness. Some latitude in the manner of expression and the aptness of terms should be permitted even though the claim language is not as precise as the examiner might desire.

MPEP § 2173.02. Although claims that are “insolubly ambiguous” or “not amendable to construction” are indefinite under § 112, ¶ 2, *Datamize, LLC v. Plumtree Software, Inc.*, 417 F.3d 1342, 1347 (Fed. Cir. 2006), where, as here, “the term ‘substantially’ serves reasonably to describe the subject matter so that its scope would be understood by persons in the field of the invention, . . . it is not indefinite.” *Verve, LLC v. Crane Cams, Inc.*, 311 F.3d at 1120.

Applicant's arguments are supported by the numerous Federal Circuit decisions approving the use of the term “substantially” under § 112, ¶ 2. *See, e.g., Verve*, 311 F.3d 1116, 1119-20 (Fed.Cir. 2002); *Ecolab Inc. v. Envirochem, Inc.*, 264 F.3d 1358, 1367 (Fed.Cir.2001); *Howmedica Osteonics Corp. v. Tranquil Prospects, Ltd.*, 401 F.3d 1367, 1373 (Fed. Cir. 2005); *LNP Engineering Plastics, Inc. v. Miller Waste Mills, Inc.*, 275 F.3d 1347, 1356 (Fed. Cir. 2001); *Andrew Corp. v. Gabriel Electronics, Inc.*, 847 F.2d 819, 821 (Fed. Cir. 1988); *Seattle Box Co., Inc.*, 731 F.2d at 826; *Kinzenbaw v. Case LLC*, 179 Fed.Appx. 20, 30 (Fed. Cir. 2006); *see also* MPEP 2173.05(b).<sup>1</sup> The Federal Circuit also has upheld the definiteness of claim terms that closely resemble “substantially the same,” including “substantially equal,” “substantially equal

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<sup>1</sup> The Federal Circuit, furthermore, has also found definite the term “substantially” even though it did not appear in the specification. *See Ecolab, Inc.*, 264 F.3d at 1367; *LNP Engineering Plastics, Inc.*, 275 F.3d at 1355.

to” and “substantially uniform.” *See Andrew Corp.*, 847 F.2d at 821 (“substantially equal”); *Seattle Box Co., Inc.*, 731 F.2d at 826 (“substantially equal to”); *Ecolab Inc.*, 264 F.3d at 1367 (“substantially uniform”).

For the foregoing reasons, Applicant respectfully requests withdrawal of the rejections under § 112, ¶ 2.

### **35 U.S.C. § 102 Rejections**

Claims 47-49, 90-93, 95-98, 107 and 110 were rejected as anticipated by Boutros et al. (U.S. Patent No. 6,635,507).

Claims 47-48, 65-66, 68-69, 86-87, 89-91, 93, 95, 97-101, 103-104 and 106-108 were rejected as anticipated by JP 9-64397 (the ‘397 reference).

Claims 47-57, 59, 61, 65-68, 70 and 86-111 were rejected as anticipated by Ho et al. (WO 99/62125).

In view of the above amendments and the following remarks, applicants respectfully request withdrawal of the rejections and allowance of the claims.

Currently amended claim 47 recites a solar cell device that includes a first region having a sequence of layers of semiconductor material, which form a sequence of cells of a multijunction solar cell, and a second region in which the sequence of layers of semiconductor material are “laterally spaced apart and laterally separated” from the first region and form a support for an integral bypass diode that protects the sequence of cells against reverse bias breakdown. The sequence of layers in the first region and second region are identical and each layer in the first region has substantially the same composition and thickness as a corresponding layer in the second region. Support for those features may be found in the specification in the example of FIG. 8 which shows a sequence of layers forming a triple junction solar cell 640 and a region laterally separated and laterally spaced apart from the solar cell 640 beneath and supporting a bypass diode 620. The layers within the triple junction solar cell 640 are substantially the same thickness and composition as corresponding layers in the sequence of layers that support bypass diode 620. Furthermore, the sequence in which the layers within the

triple junction solar cell 640 are formed is identical to the sequence of layers that support bypass diode 620.

In contrast, none of the cited references discloses or suggests the features recited in claim 47. Regarding the Boutros patent, there is no disclosure or suggestion in that patent of a second region having a sequence of semiconductor layers “laterally spaced apart and laterally separated” from a first region. Instead, FIG. 8 of the Boutros patent clearly shows a solar cell assembly 800 in which *all* of the semiconductor layers that form solar cells 804, 806 and isolation layer 808 are formed as *contiguous* layers. The Boutros patent neither discloses or suggests that any of those layers may “laterally spaced apart and *laterally separated*” as recited in present claim 47.

The ‘397 reference discloses variations of a solar cell device that includes a solar battery element (101, 201, 301) connected to a diode component (102, 202, 302), both of which are formed of semiconductor layers on a substrate (103, 203, 303) (*see* FIGS. 1-3). The ‘397 reference does not, however, disclose or suggest that those solar cell devices include the features recited in present claim 47. Although FIG. 1 of the ‘397 reference shows the semiconductor layers of the solar battery element 101 are separate from diode component 102, the sequence of layers that form each component is not “*identical*.” Furthermore, each layer in the solar battery element 101 *does not* have substantially the “same composition and thickness” as a corresponding layer in the diode component 102. For example, FIG. 1 clearly shows that the first layer 104A formed on substrate 103 in solar battery 101 is *thinner* than the first layer 105D formed on substrate 103 in the diode component 102. In addition, neither FIG. 2 nor FIG. 3 of the ‘397 reference shows a sequence of semiconductor layers in a second region that are “laterally spaced apart and laterally separated.” Instead, FIG. 2 shows the layers 205A, 204B of solar battery 201 *contiguous* with the layers 205A, 204B of the diode component 202 while FIG. 3 shows diode component 302 *beneath* the solar battery 301.

Similarly, the Ho reference does not disclose or suggest the features recited in present claim 47. The Ho reference discloses examples of a solar cell (*see* FIGS. 12 and 14B and pgs. 6-8; layers 1206-1218 or 1402-1432 on left side of the recess) connected to a bypass diode (layers 1214-1216 or 1414-1416 on right side of the recess). Although FIG. 14B of the Ho reference shows GaAs layers 1412-1414 of bypass diode 1410 separated from corresponding layers in a solar cell, the layers 1412-1414 do not “form a *support*” for a bypass diode. Instead, the Ho

reference clearly discloses that the layers 1412-1414 *are* a bypass diode (*see* pg. 8, lines 6-8). In addition, although layers 1430-1408 may appear to support bypass diode 1410, they are not “laterally spaced apart and laterally separated” as further recited by claim 47.

Furthermore, although FIG. 12 of the Ho reference discloses semiconductor layers that are laterally separated, there is no disclosure or suggestion that a “top layer of [a] top cell” in a multijunction solar cell has the same polarity as a “bottom layer of [a] bypass diode.” As shown in FIG. 12 of the Ho reference, the top layer of the top solar cell formed in the region to the left of the recess corresponds to p-GaAs diode layer 1216 while the bottom layer of a bypass diode corresponds to the n-GaAs diode layer 1214 in the region to the right of the recess. Clearly, the polarity of the diode layer 1214 is different from the polarity of the diode layer 1216.

Furthermore, Applicants note that a person of ordinary skill in the art would not consider the Ge substrate (1204 or 1402) as a “top layer of a top solar cell.” It is well known in the art that a “top” layer is labeled as such in reference to a substrate. For example, FIG. 6 of the present application shows a “top solar cell 608” (par. 0054) formed over a Ge substrate 602. Indeed, even the Ho reference discloses that layers 1422, 1424 “form the conventional top cell” (pg. 8, line 12). Therefore, a person of ordinary skill in the art would not regard the substrate 1204, on which the solar cells are formed, as a “top layer of a top solar cell.” Moreover, even if the n-type Ge substrate 1204 corresponds to the “top” layer of a “top” solar cell, as asserted by the Office Action, then the corresponding bottom layer of the bypass diode (p-type GaAs layer 1216) would still have an *opposite* polarity.

At least for the foregoing reasons, claim 47 should be allowed.

Claims 48-49 depend from claim 47 and should be allowed for at least the same reasons as claim 47.

Likewise, independent claim 50 recites a sequence of layers of semiconductor material in a second region “laterally separated” by a trough from a first region in which the sequence of layers is “identical” in both a bypass device and a subcell and each layer in the sequence has substantially the “same composition and thickness.” Claim 50 further recites that the sequence of layers in the second region form “a support for an integral bypass diode” in which the bottom layer of the bypass diode is the same polarity as the top layer of a top subcell. Those features are

not disclosed or suggested by the cited references. Therefore, claim 50 should be allowed.

Claims 51-64 depend from claim 50 and should be allowed for at least the same reasons as claim 50.

In addition, independent claim 86 recites a first portion and a second portion having an "identical sequence of semiconductor layers" having substantially the "same composition and thickness" in which a top layer of a top solar cell has the same polarity as a bottom layer of a means for passing current when the solar cell is shaded. Those features are not disclosed or suggested by the cited references. Therefore, claim 86 should be allowed. Claims 87-89 depend from claim 86 and should be allowed for at least the same reasons as claim 86.

Claim 90 recites a sequence of layers of semiconductor material in a second region that is "laterally spaced apart and laterally separated" from an "identical" sequence in a first region and which forms a support for a bypass diode. Claim 90 further recites that the bottom layer of the bypass diode is of the same polarity as a top layer of a top subcell of a multijunction solar cell. Those features are not disclosed or suggested by the cited references. Therefore, claim 90 should be allowed. Claims 91-92 depend from claim 90 and should be allowed for at least the same reasons as claim 90.

Claim 65 recites a solar cell semiconductor device which includes a substrate, a first sequence of layers of semiconductor material, forming at least one cell of a multijunction solar cell, deposited on the substrate and a second region having an "identical" sequence of semiconductor layers as the first region in which the layers in the second region have substantially the same composition and thickness as a corresponding layer in the first region.

As discussed above, the '397 reference does not disclose or suggest that the sequence of layers in a solar battery element (101, 201, 301) is "identical" to a sequence of layers in a diode element (102, 202, 302) or that the layers in the solar battery element have "substantially the same composition and thickness" as a corresponding layer in the diode element.

Regarding the Ho reference, the Office Action asserts that the Ge substrate 1402 corresponds to both the claimed "top layer of a top subcell" and the claimed "substrate" (*see* pg. 12-13). Applicants respectfully disagree and note that the Office Action has incorrectly associated two separate features of the present claim to a single element of the Ho reference.



Claim 65 recites a substrate and a “first sequence of layers...deposited on said substrate” in which the sequence of layers forms a cell of a multijunction solar cell. Clearly, the substrate and the top layer of a top cell of a multijunction solar cell correspond to two separate and distinct features of the present claim. Therefore, the Ge substrate 1402 of the Ho reference cannot correspond to *both* the claimed substrate and the top layer of a top subcell. Furthermore, as discussed above, a person of ordinary skill in the art would not consider the Ge substrate 1204 as a “top layer of a top solar cell.”

At least for the foregoing reasons, claim 65 should be allowed.

Claims 66-73 depend from claim 65 and should be allowed for at least the same reasons as claim 65.

Likewise, claim 93 recites a substrate and a sequence of layers of material deposited on the substrate in which the sequence of layers forms a plurality of cells of a multijunction solar cell in a first region. Claim 93 further recites that the sequence of layers in the first region is identical to the sequence of layers in a second region and that each layer in the first region has substantially the same composition and thickness as a corresponding layer in the second region. As discussed above, those features are not disclosed or suggested by the cited references. Therefore, claim 93 should be allowed. Claims 94-99 depend from claim 93 and should be allowed for at least the same reasons as claim 93.

In addition, claim 100 recites a substrate and a sequence of layers of material deposited on the substrate in which the sequence of layers forms at least one cell of a multijunction solar cell in a first region. Claim 100 further recites that the sequence of layers in the first region is identical to the sequence of layers in a second region and that each layer in the first region has substantially the same composition and thickness as a corresponding layer in the second region. As discussed above, those features are not disclosed or suggested by the cited references. Therefore, claim 100 should be allowed. Claims 101-106 depend from claim 100 and should be allowed for at least the same reasons as claim 100.

Claim 107 recites a substrate and a sequence of layers of material deposited on the substrate in which a lower portion of the sequence of layers forms a multijunction solar cell in a first region. Claim 100 further recites that the sequence of layers in the first region is identical to

the sequence of layers in a second region and that each layer in the first region has substantially the same composition and thickness as a corresponding layer in the second region. As discussed above, those features are not disclosed or suggested by the cited references. Therefore, claim 107 should be allowed. Claims 108-111 depend from claim 107 and should be allowed for at least the same reasons as claim 107.

It is believed that all of the pending claims have been addressed. However, the absence of a reply to a specific rejection, issue or comment does not signify agreement with or concession of that rejection, issue or comment. In addition, because the arguments made above may not be exhaustive, there may be reasons for patentability of any or all pending claims (or other claims) that have not been expressed. Finally, nothing in this paper should be construed as an intent to concede any issue with regard to any claim, except as specifically stated in this paper, and the amendment of any claim does not necessarily signify concession of unpatentability of the claim prior to its amendment.

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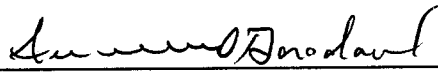
Conclusion

In view of the foregoing remarks, applicant submits that all claims are allowable and a Notice of Allowance should be issued.

The fee for the RCE is being paid concurrently herewith on the Electronic Filing System (EFS) by way of Deposit Account authorization. Please apply any other charges or credits to Deposit Account No. 06-1050.

Respectfully submitted,

Date: 12/21/06

  
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